The Claims

1. A process for treating a permeable architectural material having a surface comprising spraying onto the surface a liquid dispersion comprising a photocatalytic metal oxide or metal sulfide, spraying onto the surface a liquid dispersion comprising an adhesion promoter, and allowing the adhesion promoter to cure and fix the photocatalytic metal oxide or metal sulfide to the surface.

2. The process of claim 1, wherein the architectural material is a fascia coating, concrete slab, paving stone, architectonic concrete, tile, concrete, terracotta, slate, or stone.

3. The process of claim 1, wherein the photocatalytic metal oxide comprises titanium oxide that is at least partially crystallized in anatase form.

4. The process of claim 1, wherein the photocatalytic metal oxide or metal sulfide are particles with an average diameter of not more than 150 nm.

5. The process of claim 4, wherein the average diameter is between 20 and 60 nm.

6. The process of claim 4, wherein the liquid dispersion comprising the photocatalytic metal oxide or metal sulfide is a colloidal suspension in an aqueous phase.

7. The process of claim 1, wherein the liquid dispersion is an aqueous dispersion.

8. The process of claim 7, wherein the liquid dispersion comprising the adhesion promoter is an aqueous dispersion and curing the adhesion promoter involves a chemical or physical change of the adhesion promoter after it is sprayed on the architectural surface to make the adhesion promoter insoluble in the aqueous dispersion.

9. The process of claim 8, wherein the chemical or physical change is hydrolysis, carbonation, crosslinking, or coalescence.

10. The process of claim 1, wherein the adhesion promotor is selected from the group consisting of: (a) organometallic compounds of formula $M(OR)_4$ or $M(OR)_3R^1$, wherein M is a metal and R and R^1 are each independently a straight chain or branched carbon radical having from 1 to 6 carbon atoms; (b) metal halides; (c) silicon alkoxides; (d) alkali metal silicates; (e) alkaline-earth metal silicates; (f) aluminosilicates; (g) polysiloxanes; and (h) mixtures thereof.

11. The process of claim 10, wherein the M is Ti or Zr.

12. The processof claim 10, wherein the metal halide is $TiCl_4$.

13. The process of claim 10, wherein the alkali metal silicate is potassium silicate, sodium silicate, or lithium silicate.

14. The process of claim 1, wherein the liquid dispersion comprising the photocatalytic metal oxide or metal sulfide comprises water and the liquid dispersion comprising an adhesion promotor comprises water.

15. The process of claim 1, wherein the liquid dispersion comprising the photocatalytic metal oxide or metal sulfide and the liquid dispersion comprising the adhesion promotor are sprayed on the architectural material simultaneously.

16. The process of claim 15, wherein the the photocatalytic metal oxide or metal sulfide and the adhesion promotor are contained within the same liquid dispersion.

17. The process of claim 1, wherein the liquid dispersion comprising the photocatalytic metal oxide or metal sulfide and the liquid dispersion comprising the adhesion promotor are sprayed on the architectural material sequentially.

18. The process of claim 17, wherein the architectural material is first sprayed with the liquid dispersion comprising the photocatalytic metal oxide or metal sulfide and is then sprayed with the liquid dispersion comprising the adhesion promoter.

19. The process of claim 1, wherein the liquid dispersion comprising the photocatalytic metal oxide or metal sulfide and the liquid dispersion comprising the adhesion promotor impregnate the architectural material to a depth of up to 400 μm.

20. The process of claim 19, wherein the liquid dispersion comprising the photocatalytic metal oxide or metal sulfide and the liquid dispersion comprising the adhesion promotor impregnate the architectural material to a depth of up to 100 μm.

21. The process of claim 1, wherein at least one of the liquid dispersion comprising the photocatalytic metal oxide or metal sulfide or the liquid dispersion comprising the adhesion promoter further comprises an additive that stabilizes the dispersion.

22. The process of claim 21, wherein the additive is selected from the group consisting of β-diketones, acids, glycols, polycarboxylates, silanes, and mixtures thereof.

23. The process of claim 1, wherein the solids content of the liquid dispersion comprising the photocatalytic metal oxide or metal sulfide is between 0.5% and 30%.

24. The method of claim 23, wherein the solids content of the liquid dispersion comprising the photocatalytic metal oxide or metal sulfide is between 1% and 5%.

25. The process of claim 1, wherein the solids content of the liquid dispersion comprising the adhesion promoter is between 0.2% and 20%.

26. The process of claim 25, wherein the solids content of the liquid dispersion comprising the adhesion promoter is between 0.25% and 2%.

27. The method of claim 1, wherein the liquid dispersion comprising the photocatalytic metal oxide or metal sulfide and the liquid dispersion comprising the adhesion promoter is sprayed on the architectural material in an amount of between $0.5g/m^2$ and $10g/m^2$ of the surface.

28. The method of claim 27, wherein amount is between $1g/m^2$ and $10g/m^2$.

29. An aqueous liquid dispersion comprising a photocatalytic metal oxide or metal sulphide and an adhesion component selected from the group consisting of : (a) organometallic compounds of formula $M(OR)_4$ or $M(OR)_3R^1$, wherein M is a metal and R and R^1 are each independently a straight chain or branched carbon radical having from 1 to 6 carbon atoms; (b) alkali metal silicates; (c) alkaline-earth metal silicates; (d) aluminosilicates; (e) polysiloxanes; (f) silicon alkoxides; and (g) mixtures thereof.

30. The liquid dispersion of claim 29, wherein the photocatalytic metal oxide or metal sulphide is titanium oxide at least partially crystallized in anatase form and the dispersion is a colloidal suspension.

31. The liquid dispersion of claim 29 further comprising an additive to stabilize the dispersion.

32. The liquid dispersion of claim 31, wherein the additive is selected from the group consisting of β-diketones, acids, glycols, polycarboxylates, silanes, and mixtures thereof.

33. The liquid dispersion of claim 29, wherein the solids content of the liquid dispersion is between 0.5% and 2%.

34. The liquid dispersion of claim 33, wherein between 50% and 80% of the solids content is the photocatalytic metal oxide or metal sulphide and between 20% to 50% of the solids content is the adhesion promoter.

35. A permeable architectural material having a surface that is impregnated with a photocatalytic metal oxide or metal sulfide that is fixed to the surface with one or more fixatives obtained from curing one or more adhesion promoters.

36. The permeable architectural material of claim 35, wherein the surface is impregnated to a depth of up to 400 μm.

37. The permeable architectural material of claim 36, wherein the surface is impregnated to a depth of up to 20 μm.

38. The permeable architectural material of claim 35, wherein the photocatalytic metal oxide or metal sulfide comprises titanium oxide that is at least partially crystallized in anatase form.

39. The permeable architectural material of claim 35, wherein the adhesion promoter is selected from the group consisting of: (a) organometallic compounds of formula $M(OR)_4$ or $M(OR)_3R^1$, wherein M is a metal and R and R^1 are each independently a straight chain or branched carbon radical having from 1 to 6 carbon atoms; (b) alkali metal silicates; (c) alkaline-earth metal silicates; (d) aluminosilicates; (e) polysiloxanes; (f) silicon alkoxides; and (g) mixtures thereof.

40. A kit comprising a concentrated liquid dispersion comprising a photocatalytic metal oxide or metal sulfide and a concentrated liquid dispersion comprising an adhesion promoter.